

THE ARRIVAL OF THE FORD TRACTOR (Illustrated).  
BRITISH FIELD AND GARDEN WORK IN FRANCE.

# COUNTRY LIFE

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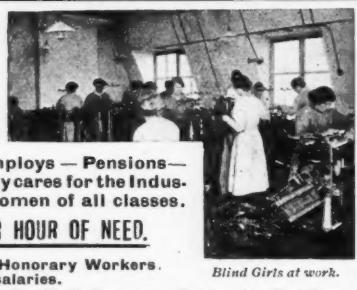
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# COUNTRY LIFE

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MAJOR-GENERAL SIR HUGH MONTAGUE TRENCHARD, K.C.B., D.S.O.  
*Chief of the Air Staff of the newly constituted Air Council.*

*From a drawing by Francis Dodd, one of the Official British Artists,*

# COUNTRY LIFE

THE JOURNAL FOR ALL INTERESTED IN  
COUNTRY LIFE & COUNTRY PURSUITS

OFFICES: 20, TAVISTOCK STREET, COVENT GARDEN, W.C.

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## EDITORIAL NOTICE

The charge for Small Estate Announcements is 12s. per inch per insertion, the minimum space being half an inch, approximately 48 words, for which the charge is 6s. per insertion. All advertisements must be prepaid.

## THE SILO IN WAR-TIME

IT becomes increasingly evident that if English stock-breeding is to maintain an important place in husbandry the farmer will have to look round for a source of plentiful and cheap food. At bottom the lack of it is the cause of the serious inconvenience of the moment. Farmers have become dependent on cake and other concentrated feeding stuffs imported from abroad. When the supply runs short most of them are bewildered. They deserve sympathy. At the moment the trade of the stock-breeder has fallen on evil days and the consuming public has been made to feel the consequences. Milk and meat, the two main products for which cattle are kept, have become scarce and dear. So much is made plain to the dullest witted by occurrences of which it is impossible to mistake the import. The dairyman, far from rejoicing over the additional money he obtains for milk, is thoroughly discontented. He finds the cost of cow-keeping going up to a point at which it threatens to leave nothing in his pockets. To get out of a bad situation he has begun to condition his cows and heifers for the fat cattle sales. Owners of stock ultimately designed for the butcher are in no better case. They cannot feed their cattle in the old style, and so the child is threatened with milkless days and John Bull has to forego his Sunday joint. And that is how famine advances. First of one commodity, then of another there is scarcity till the figure of Want hovers over the whole domain of food. For the present it is only a threat—in part to be explained by inefficient distribution—but it will become a reality next year unless those who provide food, that is to say, the farmers, are wise in time. There is meat enough to go round for some time to come, but the avoidance of certain danger can only be assured by the farmers setting themselves to be to a great extent independent of foreign supplies during the months of winter.

This can only be done by a more extended use of ensilage. A complaint commonly heard from dairymen is that a chief source of food supply is denied them by ploughing up so many pastures. Progressive agriculture will retort that stock feeding on arable is easier than on pasture. That is perfectly true, only the average man has not yet realised it. He has not grasped the idea that Miss Coats, for example, has carried out with such conspicuous success at Brattles. A silo used in conjunction with catch crops would enable the farmer to provide abundance of food during winter. The silo has been described as "a structure having air-tight and moisture-proof walls in which a forage crop is stored and preserved indefinitely." In the United States its possibilities were fully grasped years ago and the number of silos in use shows a marked annual increase. The movement has lagged here because the tenant farmer alleged himself unable to undertake the necessary outlay. A really good silo costs money. Enterprising men who thought they could not afford it in days gone by often adapted part of a barn or other outhouse to the purpose, or merely stacked and heavily pressed the material, making a gain in feeding stuffs, although not going about it in what is really the most economical way. Others have neglected it altogether. But the moment is most opportune for rectifying the omission. Farmers cannot as a class complain of any lack of prosperity just now and, therefore, have a chance they will neglect at their peril to add this most remunerative equipment to their holding. To put up a silo is a plain and logical sequel to that revolution from pastoral to arable farming which has been forced upon them by the march of events. Its complement is an extended system of catch-cropping, as it will enable them to store in good system the produce of such crops. A lesson all will have to learn is that stock can be even more successfully kept on arable than on pasture. It will assuredly be so for many years to come and probably for ever. There could not be a more promising investment of farming capital. In regard to the material used as silage, a large choice is open. A good practice is to choose a leguminous fodder crop, consisting of beans, tares and, perhaps, oats, which will yield about fifteen tons of silage per acre. Such a crop has the additional advantage of smothering weeds, so that the cleaning of the land is a subsidiary advantage of using the silo. The crop will have a feeding value as high as roots, and is much cheaper to produce.

The Board of Agriculture discussed the question in one of their early leaflets, No. 9, written in 1893 and revised in November, 1907. Although a good deal of information has been got together since then, the farmer will not do badly to turn up the Board's instruction. The materials recommended there for silage are, meadow grass, lucerne, clover, sanfoin, Italian rye grass, grass and clover mixtures, maize and any other green fodder crops that can be spared. In America, maize is the favourite silo crop, and it has been largely employed for this purpose in this country. It is sown from the middle of May to the middle of June. Care must be taken to protect against rooks. They consumed nearly all the seed sown for the first crop on the reclaimed land at Dartmoor. But failing a set crop, all classes of herbage on farms may, if necessary, be utilised for silage, even weeds and nettles, have been successfully employed. Grass, clovers, lucerne, vetches, etc., require no preparation, but are simply mown closely, carried to the silo, stacked or clamped, and compressed as tightly as possible, so that the air may not penetrate between the layers. Sweet silage is prepared by filling rather slowly to ensure a temperature of from 130 deg. (Fahr.) to 160 deg. (Fahr.), which neutralises the acid fermentation. The expert of the Board of Agriculture refers to the case of a dairy farmer who for some years kept a herd of forty-five dairy cows almost entirely upon silage made in stacks, with an allowance of oil cake.

## Our Frontispiece

THE portrait we reproduce this week is from a drawing of Major-General Sir Hugh Montague Trenchard, K.C.B., D.S.O., who recently became Chief of the Air Staff of the new Air Council. Sir Hugh Trenchard was appointed Extra A.D.C. to H.M. the King in 1915. During the present war he has served in the Royal Flying Corps (despatches, 3rd Class St. Anne Order, Legion of Honour, Order of Leopold of Belgium).

\* \* \* It is particularly requested that no permissions to photograph houses, gardens or livestock on behalf of COUNTRY LIFE be granted except when direct application is made from the offices of the paper.

# COUNTRY NOTES



**T**HE food difficulties which are beginning to weigh heavily on all classes, emphasise the need of better transport that we suggested last week. There are plenty of potatoes in the country, and if they could be carried to the towns and distributed there, nothing serious could happen. Anyone who has a good meal of potatoes is, at any rate, far from want. But, at the same time, steps would have to be taken to force the hand of the potato farmer. He is not opening his clamps because of a belief born of what occurred last year, that great prices will be obtained towards the end of the season. It is very plain that as the months go by the food position will grow tenser than ever, and potatoes, whatever the surplus, must grow in demand. The shortage of meat makes it all the more necessary to provide vegetable food, and there is none cheaper or more abundant than is to be found in the potato. Two measures are needed to admit the fullest use of supplies. First, the supply must be loosened and the clamps opened, compulsorily, if need be; and second, transport improved (a) by utilising military wagons, (b) by rearranging rates, establishing a zone flat rate, or whatever may be necessary.

**MR. LLOYD GEORGE'S** speech to the Labour delegates last Saturday in its sober restraint was more suited to the genius of Englishmen than any perfervid oratory is. It is most desirable that at this crisis in affairs, when the gravity of the position increases every day, that the aims for which the Entente Powers are fighting should be set forth with the utmost lucidity and the least possible amount of heat. The Prime Minister succeeded in doing that. His description of our war aims might have been addressed to Mr. Ramsay Macdonald himself. No one could demand less, and the Prime Minister evidently set himself not to fix his claim too high. He was addressing an audience of working men, who like being spoken to in the language of fact.

**THE** most signal parts of his speech were those in which he summarily dismissed the bag and baggage policy from the Turkish part of the programme and offered to let the Turk remain in his own capital. He said nothing about the Hohenzollern Dynasty or about shattering the military authority in Germany. Associating himself with France, he put forward only the irreducible minimum; and in regard to Belgium, every civilised country must recognise that here is no case for indemnities, but only for the justice of compensating a small and innocent people for the insults and ravage done within their territories. For the colonies which compose the lost German Empire, he proposes that each, marshalled under its native chief, should choose under which king. It is a pity that this speech could not be distributed among the subjects of the Kaiser, as a knowledge of its substance would enlighten and disillusion them.

**UNTIL** now the Government have shown no sign of relenting in their resolve to turn the British Museum into offices for the Air Board. They are deaf to the protests which have come from what one would have expected them to consider the most influential quarters. Scholars like Sir John Sandys,

great literary experts like Sir Sidney Lee, trustees of the Museum, and many members of that intelligent part of the public which holds the British Museum to be one of the most precious possessions of the Empire and, indeed, of the world, have so far made them in vain. A reply or excuse was indeed sent out by the authorities, but it was one of the lamest imaginable and showed no realisation of the enormity of the proceeding that is being contemplated, or rather has passed that stage and is being carried into effect. It remains to be seen whether the Nation as a whole is going to acquiesce calmly in a step which has no parallel in anything done by other belligerent powers. The whole power of public opinion and the Press should be concentrated on persuading the Government to a different course.

IT is useless to plead, as they have done, economy and the difficulty of getting other premises. In the first place, nobody is likely to indulge in any fervent belief in the economy practised by this Government during the war. They cannot atone for a profuse expenditure that has taxed even the illimitable resources of the British Empire by taking steps to save the rent of a building. Economy has been preached in vain since the war started, but the outcry for it is bound to grow in intensity. The other plea, which practically amounts to saying there is no alternative, we showed last week to be untenable. But the hiring of Queen Anne's Mansions may be objected to on the ground that it would disturb too many tenants. The objection does not apply to Whitehall Court, which in space and accommodation is most suitable. But if so, why not take Chelsea Hospital? The Pensioners could not object to being sent to the country for a while. Evidently the Government hears little of the growing hum of disapproval of so many branches of Government, each with its directors and a retinue of clerks and other officials, including many thousands of young women. It is comparatively easy to understand how these armies came to be enlisted at the beginning; but, as order began to get established at the offices, it should have been possible to diminish the number of hands, instead, they have been augmented.

#### THE LAND OF FLOWERS: A VISION.

*To H——, killed in action, May 3rd, 1917.*

Night when no stars could shine  
Shadowed these lonely hours,  
Then did a white path climb  
Bordered by small, blue flowers,  
Love-in-a-mist was there  
Soft as the maiden's-hair.

On that expectant way  
Wonder within our eyes,  
Night was not night but day,  
Day of the sapphire skies,  
And the bright speedwell's blue  
Guided our feet to you.

Dawn out of yonder sea  
Gold as the daffodils  
Showed us that Love must be  
With you on yonder hills,  
Showed us your rose-sweet town  
Shine like the green vale's crown.

So 'midst the meadow-sweet  
Turned we in dream's regret,  
Glad that you paused to greet  
Friends that are pilgrims yet,  
Proud that the English rose  
In your new Kingdom grows.

MABEL LEIGH.

WE have never known the publication of a farm balance sheet to fail in arousing controversy, and even that of Miss Coats has shared the general fate. An authority whose judgment we esteem highly calls in question her practice of deducting interest on the capital she has laid out before arriving at the year's profit. The common objection to this is that money which is taken out of one investment and put into another yields profit or loss, but not interest. The point is perhaps not of the highest importance; though certainly, if one were out to buy a farm, it would be sound business to do so on a balance sheet like that of Miss Coats. But the operation is surely a perfectly sound one. Suppose, to take a very simple example, it were necessary to borrow

a thousand pounds at five per cent. as capital for a farm, the farmer would never dream of counting anything as profit until his interest of fifty pounds per annum was paid.

SURELY the principle is the same, even if he takes the amount from his own investments. Here he starts with possessing a sum of one thousand pounds invested, say, in Government Bonds and carrying five per cent. interest; that is to say, he has an income of fifty pounds a year in addition to his capital. He takes up farming because he imagines himself able to make a profit, but he has made no farming profit until his finances are just as good as they were before he started; that is to say, until he possesses either in goods or money a thousand pounds and an income of fifty pounds a year. But if this be right, then the interest on capital should be deducted in order to show a true profit and loss account.

OWNERS of tithe rent charge have reason to be thankful for the very considerable increase of income which has come to them this year. The value of the charge of £100, computed according to the septennial average of the price of wheat, barley and oats, is £109 3s. 11d. This is higher than it has been in any year since 1879, when it was £111 15s. 1½d. It had been maintained at a high level from 1867 until that date. Then it began to drop, as the great agricultural depression spread and made itself felt, until it touched its lowest point, £67 3s. 8d., in 1901. The present price puts an end for the time being to any dream of commutation. The moment for that was when the tithe stood at its lowest. The other side of the shield is not so pleasant. It is true that on many estates the owner, especially if he happened to be lord of the manor, has pursued a policy of buying tithes, but in an equal number of instances it has gone to strange hands.

THE effect of this is as follows: According to the Act of 1891, it is the landowner, and not necessarily the occupier, who is liable to the charge. Whoever has had to pay to himself, therefore, does not suffer from the rise in value, but in a general way the landowners of this country have shared very little in the war prosperity. The owners of tithe have made a lawful purchase and are entitled to the benefit of any prudence or wisdom they have shown; but nevertheless it is a hardship on the landowner that at a time when his outlay is continually being widened and his receipts do not make a corresponding growth he should have to meet this increased charge on the land. And this is the more applicable because Mr. Hyndman and some of his co-workers are urging in the public Press that the landowners should do more than they have done.

THOSE who are following the movement in favour of land reclamation will feel vividly interested in the work of this nature which has been done by Sir Arthur Lee on the Chiltern Hills and is described in another portion of the paper. The agricultural expert who wrote about agriculture in the "Victoria History of the County of Buckinghamshire" sums up his remarks on the Chilterns thus: "It is not an attractive land from a farmer's point of view, but it throws up some very good herbage in a kindly season." If Sir Arthur Lee had done nothing more than show the unsuspected possibilities latent in ground like that of the Chiltern Hills he would have performed very good service, but in doing so he has added appreciably to the cultivable land of the county, and therefore to the food production of the kingdom. It is no vain contention that in a very great many districts of Great Britain land is allowed to lie waste which could be made to grow excellent food crops.

THE Woburn Reports of Mr. Spencer Pickering are invariably charged with interest, and the sixteenth of the series is like the others in this respect. The introductory pages deal mainly with apples at Ridgmont, and are more than a little puzzling. Mr. Pickering gains so little by manuring apple trees that he seems to discourage the process altogether. One bows to his authority, but with a feeling that he cannot have said the last word on the subject. Any one who grows apple trees in various forms, such as standards, bushes, pyramids, cordons, and so on, is under the belief—perhaps Mr. Pickering would say hallucination—that those taken most care of yield the best results.

ONLY last week, writing in *The Garden* newspaper, a grower asserts a plentiful use of liquid manure in winter-time had a most beneficial effect on his trees. Other growers

choose rainy weather in June as the best time to apply liquid manure and they claim to get good results. We wonder if Mr. Spencer Pickering has tried this, as he mentions only stable manure and artificial manure in his report. But fruit growers in the main think that manure applied to the surface does not easily get down to the roots, for that reason they bore holes and apply the manure in a liquid form. Probably Mr. Pickering has tried this method, if so, it would be interesting to hear the result; and if he has not done so, it would be a service to all who have gardens if a man of his thorough scientific accuracy would experiment with a view to testing the value of these practices.

FOR many years past the extent of flax cultivation in Ireland, though considerable, has become a greatly diminished quantity. Side by side with the falling off of home production there has naturally been a steady increase in the amount of flax imported from abroad, and especially from Russia, which is by far the largest flax producing country. There is, then, a grave danger of shortage of raw material in Belfast and Dundee, and in order that it may be to some extent provided against, the Government has decided, says the *Morning Post* Belfast correspondent, to inaugurate a scheme of bounties for the farmers of the South and Midlands to induce them to grow more flax this year. It is estimated that the scheme will cost the State between £1,000,000 and £1,500,000. On the basis of an addition of two to three hundred thousand acres, this would mean a bounty to the farmer of £5 an acre sown. The experiment of growing flax in the South and Midlands will be keenly watched in the northern province, where there is some hope that the Government will extend the bounty to Ulster. Apart from promise of bounty, Ulster farmers are already making an effort to increase the acreage under cultivation. If to last season's price, which was 30s. a stone as against 7s. 6d. before the war, the bounty is added, it is believed that the crop will be really remunerative.

#### INTERCESSION SUNDAY.

January 6th, 1918.

Mightily flamed the heavens, blood-red at dawning day—  
Over the silent ocean the hues of battle lay—  
And the hearts of men expectant were stilled to wonder's sway.

Then, as the sun leapt upward, the clouds of golden-red  
Lifted on high in triumph the souls of our countless dead—  
And o'er the clearing heavens the wings of Peace were spread.

E. M. MILLS.

PROFESSOR STANLEY GARDINER and Professor Nuttall have issued a joint letter recommending the freezing of fish so as to make them available at any distance from the port at which they are landed and within any reasonable time. Without going closely into the methods they recommend, a word may be said about the importance of the suggestion. During the past year, even in the midst of this war, a very considerable number of fish have had to be destroyed because they belonged to an unusually large catch, and the local curing plant was not adequate to their disposal. The principal effort to deal with the overplus was by pickling. Evidently those who had the requisite outfit for this used it to the largest possible extent, because since the harvest of the year was gathered pickled herrings have been advertised for sale by the barrel and half-barrel and firkin week after week in the local papers, thus showing that there was not anything like the rush on them that there was on other articles of diet. Yet the food value of the herring stands very high. It follows from all this that if the advice of Professors Gardiner and Nuttall could be carried out in such a manner as would result in the preservation by some method of cold storage of the surplus fish of the exceptionally large catches which cannot be otherwise dealt with, a very important addition would be made to the food supplies of the nation. Fish curers cannot reasonably be expected to keep a plant sufficient for the extraordinary shoal that comes to that particular port only once in an average of seven years.

IN connection with our recent article "Augustus John and His Work," we reproduced Mr. John's fine and, perhaps, most important picture, "The Smiling Woman." Unfortunately, we omitted to state that the copyright of this picture is in the possession of the Hon. W. R. Shute Barrington, to whom we tender our thanks for very kindly allowing the reproduction and our regrets that the acknowledgment was not made at the time.

# THE ARRIVAL OF THE FORD TRACTOR



THE TRACTOR AT WORK.

SINCE Jason furrowed the land to sow it with dragons' teeth no agricultural implement has made such a commotion as the Ford tractor, and its arrival in England deserves to be chronicled in the grand style. But as it has to engage in the homely task of ploughing up English pasture, the heroic would be out of place. We can only draw attention to the occurrence foretold by a prophet of our time who saw it at work on the fields near its native Detroit. Every sort and diversity of opinion has been expressed towards this contrivance, which before its birth—if a bull may be permitted—was greeted with a noise of welcome from our Board of Agriculture and the engineering pundits of the Royal Agricultural Society of England. It has not devolved upon us to take any part in the controversies which have raged round it. Some have probably miscalled it too much, others praised it too highly. But, at any rate, the custom of the British farmer is to judge an invention by its use, as he does the plum pudding by eating it. Ford tractors there have been in this country, but they were entitled to that name only because they were fathered by Mr. Ford, who never intended them to be taken as the last and finished product of his invention. To its elaboration and improvement he has devoted a great deal of time; ages, indeed, seem to have passed since the heralds first trumpeted its advent. In order to distinguish it from its predecessor he has given it a name of its own—the Fordson or the nomenclature, at all events, being a pure outcome of fine and careless art. It has been the good fortune of our Machinery Expert, who will discourse below on its technical characteristics, to secure the first illustration of this improved tractor. It will be seen from his well considered description that it is, at any rate, highly interesting, as it was sure to be. Mr. Ford is allowed by all who know to be one of the engineering geniuses of the day, and when he set his mind to manufacture a tractor for British use it was regarded as a certainty that he would give us something really worth attention. Whether the tractor will suit British requirements or not is a matter on which we have no intention of pronouncing a pre-judgment. It is on the sea now, and before these lines are read may possibly be landed on our shores. It will receive the welcome it deserves from the British farmer, who, overburdened by the task of ploughing the many acres allotted to him by his Agricultural Executive Committee, longs for the assistance that a light, efficient implement would give him. The complaint one hears most frequently at present is that the tractor ploughs in use are too heavy for the moist clay soil which is prevalent in Great Britain. On the other hand, it must be very difficult for an American who is accustomed to produce farm machinery for land differing in character from that in this country to meet the needs of the latter at a first venture. Be this as it may, the Fordson arrives at a time of great national necessity, and the Food Production Department will perform a welcome task when they are able to distribute

these ploughs among the counties that are clamouring for more power. At all events, we are sure that the English farmer will be very glad of an opportunity to study the first illustrations of the machine which have been shown in England and to read the explanatory comments attached to them by "Ploughshare." It will familiarise him with a piece of machinery in whose success or failure he is vitally interested.

#### A TECHNICAL DESCRIPTION BY "PLOUGHSHARE."

In looking through the detailed descriptions of the machine and comparing them with the original M.O.M. Ford tractor, which I had the good fortune to see at work and to examine carefully, I find that, while the Fordson machine is the same in principle as the original M.O.M., it is quite different in many important details of its construction. So far as I am able to judge from the evidence before me, each of these alterations is an improvement, either in practical efficiency or from the manufacturing point of view.

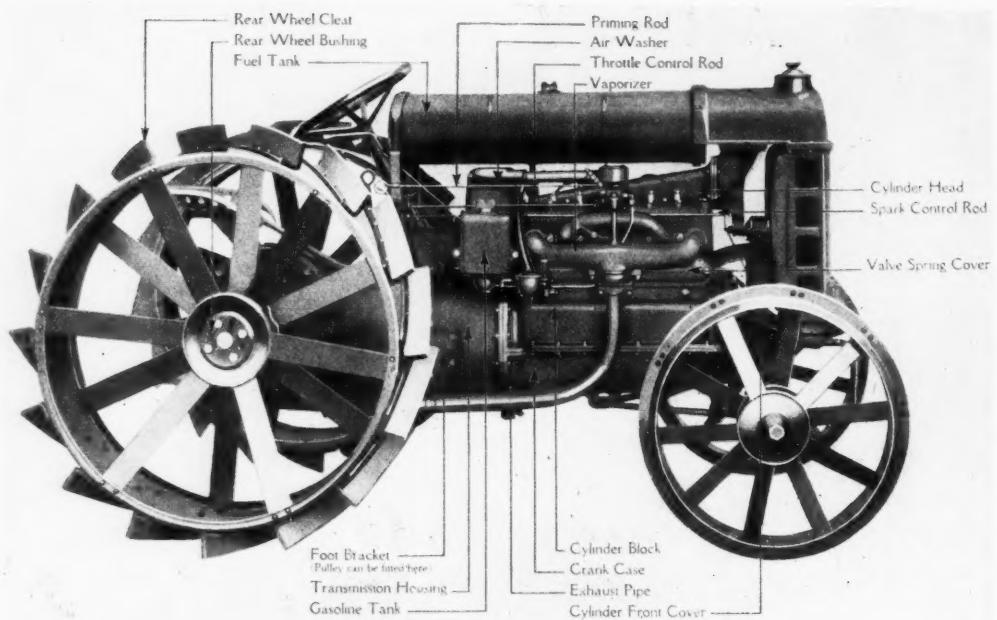
I have just referred to the many differences in constructional details between the original M.O.M. Ford seen by me and the present day Fordson tractor. These are mainly as follows:

- (1) The engine is more powerful as the stroke has been increased by half an inch.
- (2) The gear ratios are now, low speed,  $1\frac{1}{2}$  miles per hour; second speed (for ploughing),  $2\frac{1}{2}$  miles; and third speed,  $6\frac{1}{2}$  miles.
- (3) The worm drive to the rear axle is now under the worm wheel instead of over it.
- (4) The front axle is of different construction.
- (5) The driving wheels are of larger diameter.
- (6) Ball bearings are used to a greater extent.

The engine is a four-cylinder vertical model having a bore of 4ins. and stroke 5ins. The cylinder head is removable, as in the case of the Ford motor car. When running on paraffin fuel 22 b.h.p. is developed at 1,000 revolutions per minute. Automatic lubrication of the engine is secured through the centrifugal action of the flywheel which dips into an oil container in the flywheel casing. The cooling of the engine is by means of the thermo-syphon system, no water pump being used. The radiator is assisted by a fan which runs on ball bearings. The ignition is practically the same as on the Ford car, viz., a special low tension magneto built into the flywheel and used in combination with four induction coils and a commutator. Either petrol or paraffin fuel can be used, but in either event the engine must be started and run for a short time on petrol in order to heat the pipes used for vaporising the heavier fuel. The air for mixing with the fuel is drawn through a water bath which frees it from all grit and dirt. The rear wheels are 42ins. diameter and 12ins. wide, and are quickly detachable, so that other wheels can be fitted for road use. The wheel-base is 63ins. only, and the machine can turn in a 21ft. circle.

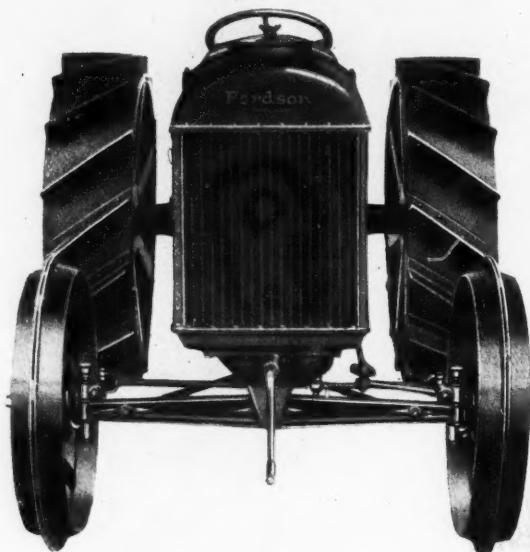
Some further details are given overleaf, together with illustrations of the parts referred to.

THIS illustration shows a general side view of the tractor. The lettering and the arrows point out the main features, but attention may be specially called to the fact that provision is made for the fitting of a belt pulley when required for driving barn or other stationary machinery. For the purpose of the illustration the bonnet cover protecting the engine, etc., from rain has been removed. It will be noted that the whole of the transmission gearing is completely enclosed from rain and dust.



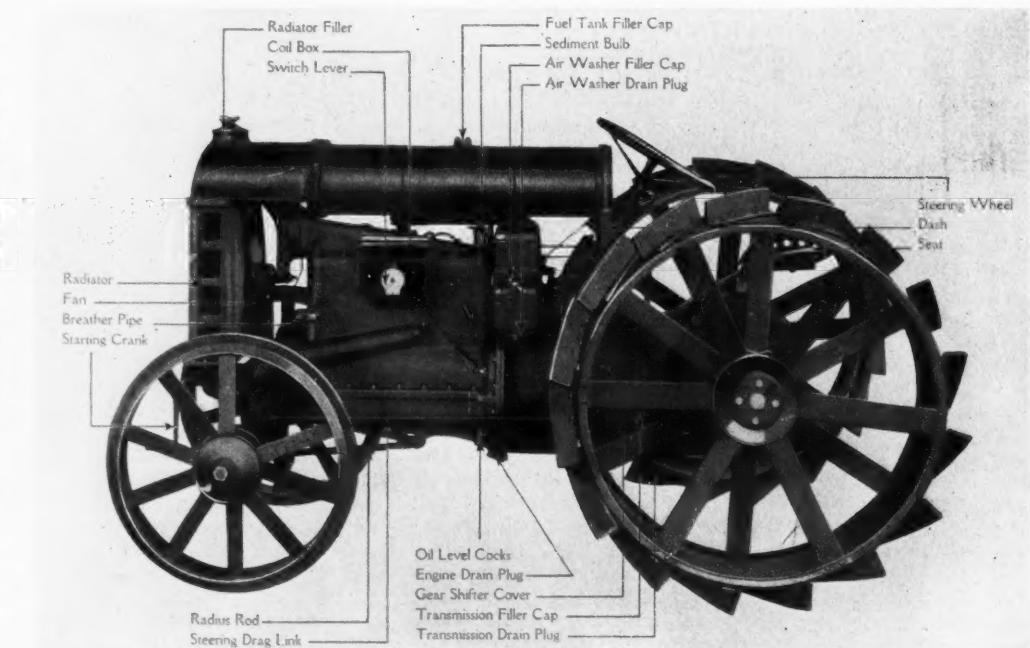
VAPORISER SIDE.

FROM the accompanying illustration the design of the front axle can be clearly seen. A constructional feature of practical advantage is the pivoting of the front axle on a central pin. The axle is thus free to lift or fall at either side as the wheels follow the contour of the ground. This removes all tendency to twist and strain the frame or to force the bearings out of alignment when rough ground is being traversed. To keep the front axle parallel to the rear axle a triangular radius rod connects each end of the axle to a swivel joint under the engine casing. This can be seen in the other illustrations on this page.



FRONT VIEW OF THE FORDSON TRACTOR.

THE appearance of the other side of the tractor is here shown. The construction of the wheels is also visible. The spokes are cast in the hubs and riveted to the rims. The front wheels run on ball bearings. The lettering on the illustration calls attention to an important detail, the oil level cocks, which prevent overfilling of the oil reservoirs. To completely oil the engine, gears, clutch bearings, back axle and driving wheel bearings only two oil reservoirs require filling at regular intervals.

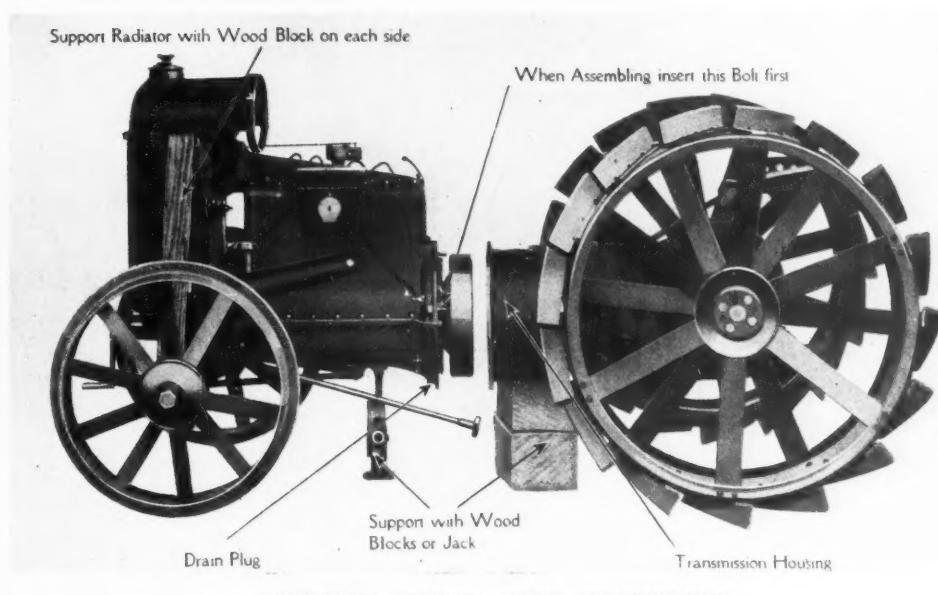


THE FORDSON TRACTOR—COIL BOX SIDE.

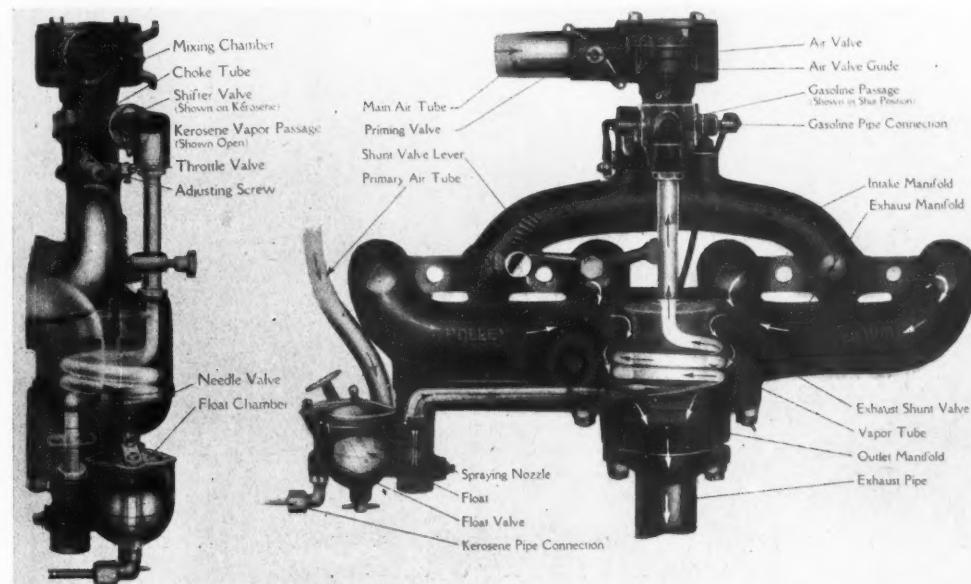
THIS picture of the tractor, with fuel tank and steering wheel removed, enables the principle of the main structure of the machine to be seen. There is no frame in the accepted sense of the word, but the engine crank case gear-box casting and rear axle casing when bolted up tightly together serve as a frame on which all the exterior fittings are mounted. The illustration appears in the Fordson manual in conjunction with instructions as to the correct way to take the tractor to pieces and to build it up again.

THE adjoining descriptive view of the fuel vaporiser is so complete it is almost fully self-explanatory. The main principle is as follows: the paraffin fuel, together with a small amount of air, is drawn up from the float chamber through the vapour tube and then *via* the mixing chamber (where it is mixed with more air) to the cylinders. The vapour tube is heated by passing through a chamber (the exhaust manifold) into which the hot gases from the engine are discharged on their way to the open air. The exhaust shunt valve regulates the extent to which the hot gases impinge upon the vapour tube, consequently the temperature of the vapour tube can be regulated to suit the fuel being used.

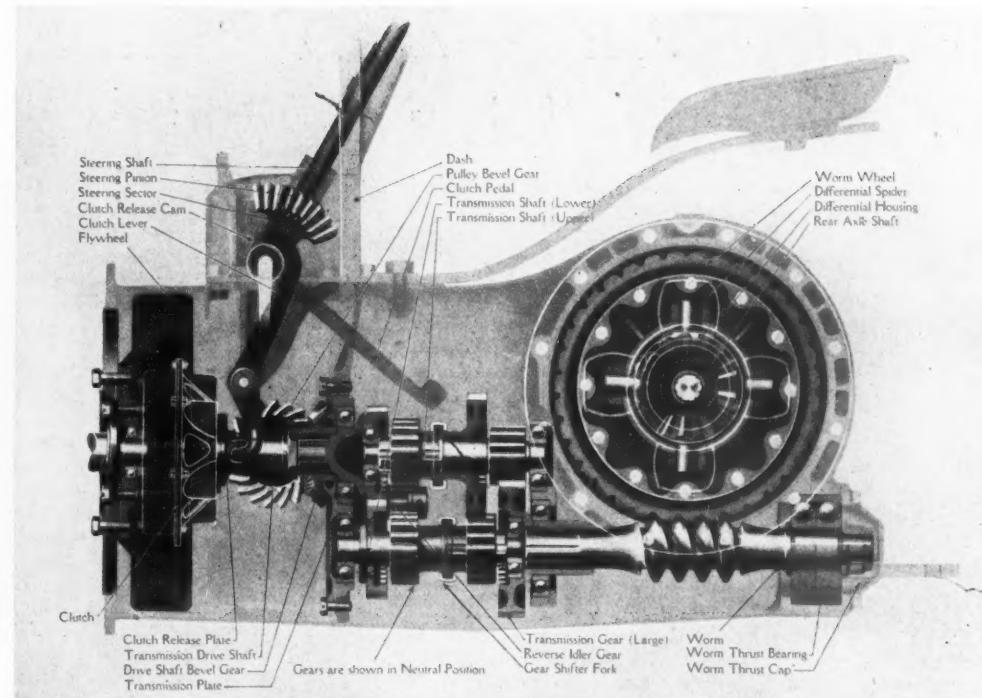
THIS is one of the most instructive illustrations, as it makes clear the general construction of the whole of the power transmission gearing from engine clutch to rear axle shaft. Three speeds forward and one reverse are provided, all gear wheels being always in mesh. The final drive is by worm gearing which at present is a very unusual form of construction for tractors. It will be noted that the worm is underneath the worm wheel, where it will revolve in the oil which is so vitally important to this form of transmission. It will also be noted that all the gear shafts and the worm shaft run on ball bearings.



REMOVING ENGINE FROM TRANSMISSION.

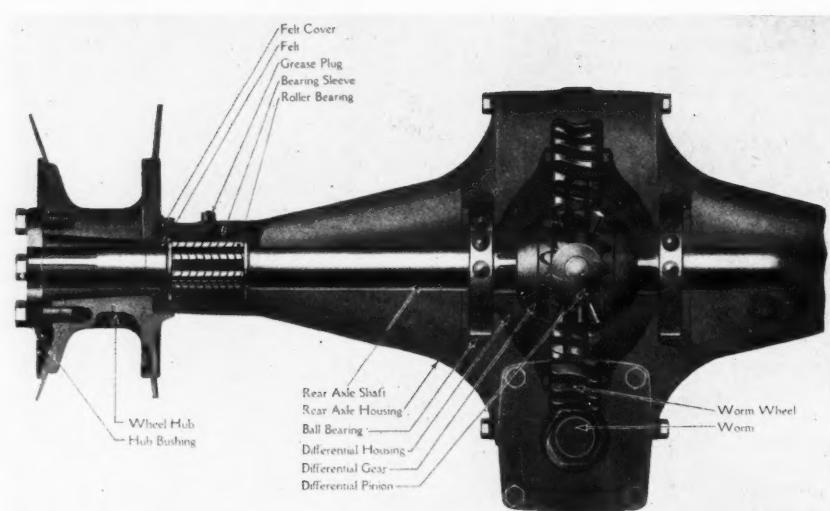


THE VAPORISER.

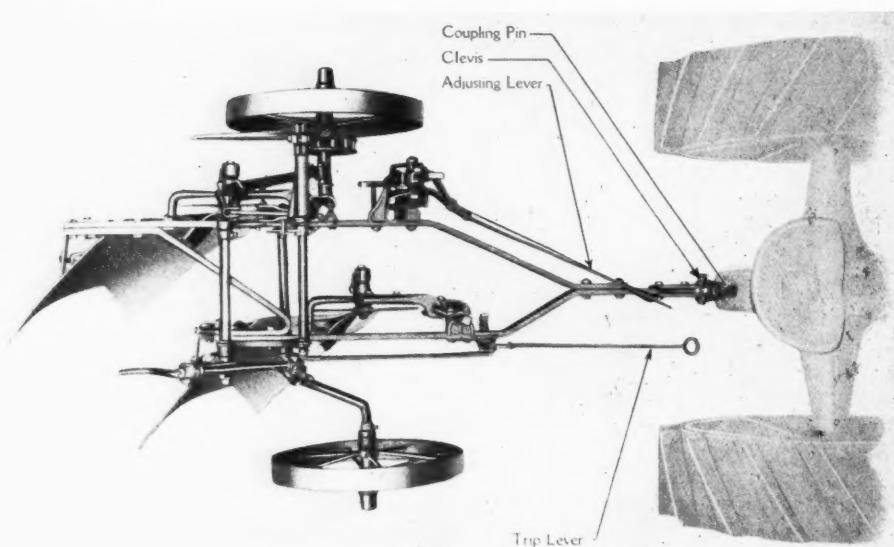


THE TRANSMISSION AND CLUTCH ASSEMBLY.

THE descriptive matter included in the illustration herewith is quite complete in itself; indeed, the rear axle and wheel assembly illustrated carries its own explanation. The rear axle applies the power received through the transmission to the rear wheels. The principal parts of the assembly are the worm and worm wheels, the differential, the axle shafts and bearings. It is lubricated by the same oil bath as the transmission.



REAR AXLE AND WHEEL ASSEMBLY.



TOP VIEW OF PLOUGH, SHOWING OPERATING LEVERS AND METHOD OF ATTACHING PLOUGH TO TRACTOR.

THE plough shown has been specially constructed by the Oliver Plough Company to the special requirements of Henry Ford and Son, and it is different from any other self-lift plough known to me which is in use in conjunction with a tractor. It will be noted that no rear furrow wheel is fitted. The plough seems to be an adaptation of the sulky, or riding plough, widely used in America in conjunction with horse ploughing.

## BRITISH FIELD AND GARDEN WORK IN FRANCE

**F**URTHER particulars go to prove that British food production in France has been put on an excellent basis. The arrangements have been made by Sir Arthur Lee acting as the head of the English Food Production Department. But it has been wisely decided that the civilian body should act only in an advisory capacity to the military authorities, whose powers are executive. Of highest importance is the division made between agriculture and horticulture. Food production on a large scale must be the business of the former. Work will be largely directed to the growing of two principal crops—potatoes and oats. If these can be grown on anything like the scale under contemplation the saving in tonnage will be enormous. A very serious burden has hitherto been laid upon Great Britain by the necessity to grow and transport the potatoes required for the consumption of our great armies in France and of oats for the horses. At present the plan is to utilise 50,000 acres for this purpose, and it is hoped that this area will be enlarged, perhaps, to 70,000 acres. The two crops will be grown, roughly, in the proportion of three-fifths potatoes and two-fifths oats. We need not enlarge on the advantages, they are obvious at a glance. In every way they will change the food situation to the benefit of France as well as Great Britain. At present the land is lying idle,

so that the crops will represent a real addition to the food supplies of the Allies. That would be equally true whoever did the actual growing. It is common knowledge that whatever scarcity there is in this country to-day is largely due to our having had to pool our resources with France and Italy. And that was only fair. War has been closer to them than to us. The English farmer has been more fortunate than the French, inasmuch as he has been able to go about his work in security and in the enjoyment of war prices. No enemy force has landed on our shores, no English farm has had its fields devastated by enemy robbers and ploughed by their shells. Moreover, our system of landholding has saved us a great deal. The British farmer complains with good cause of the scarcity of labour, but in France not only was the worker, but the owner also, subject to conscription at the beginning of the war. Both the head and the hand were taken away. Besides, a diminishing but still considerable area of French farm land is actually occupied by the enemy. Our readers may perhaps remember certain photographs reproduced in these pages. They were taken by the German officers, and showed themselves and their men harvesting the grain they had sown and cultivated on French soil. A striking proof that the thrifty Hun needed no urging to make the most of any available land! It made

it inevitable that a grave falling off should occur in French food production. Considered from the home point of view, the new arrangements must tend to relieve the stringency of the situation. Be it remembered that whatever is grown abroad in the neighbourhood of the seat of war means not only a saving of home foodstuffs, but lightens the burden of our ships.

Last week we gave a brief statement about the staff appointed to carry out the scheme of farming. The business of the Food Production Department must consist largely of providing supplies. Already a good deal has been done in this way. First of all, seed grain and seed potatoes must be got ready. We understand that arrangements have been made for acquiring some 10,000 tons of oats for that side of the programme, and seed potatoes present little difficulty. Potatoes for the Army have to a large extent been forwarded from Ireland, and Irish seed coming from a moist climate does well over here and may be expected to do equally well in France. Many of our own farmers would as soon use seed from Ireland as from Scotland. Manure, again, should prove a manageable factor owing to the large number of horses—artillery, cavalry and transport—in France. Huge dumps of stable manure have accumulated, and as military resources will be available, no great difficulty should be found in transferring it to the fields. There remains the question of ploughs and ploughmen. We stated last week that 150 steam ploughs were to be sent, but this was a mistake. So great is the demand for steam tackle in this country, that

in spite of the exertions of the makers, none will be available for our Allies. Instead tractor ploughs are being provided. A first instalment of about 250 is being sent in half units of five each, and this supply will be increased if needful. Drivers will be trained in school or college just as in this country. By the employment of these and other machinery a comparatively small amount of labour will be sufficient. There is no cause for anxiety about its provision, although this is a matter which has not yet been finally decided.

A Food Director has been appointed in the person of Lord Radnor. He is a soldier, and may be trusted to know the soldier's ways. He is also a landowner in the habit of cultivating some 6,000 acres as a home farm. These are undeniable recommendations for the novel and responsible position he is now called upon to occupy.

In regard to vegetable production, it has been decided to foster and encourage the work already started in connection with hospitals, canteens and similar formations. The Army, as some of us realise from the difficulty of obtaining this kind of labour, is well leavened with gardeners. Regiments formed in proximity to horticultural counties—Kent and Worcester, for example—are full of them, so that there are plenty from whom to pick and choose. Guernsey men are practically all gardeners, and are together in a regiment. Instead of making a few large nurseries for raising seedling plants, the plan favoured is that of pitting seed beds in four and five acre plots.

## CHRISTOPHORO PARVULO

*A New Year Greeting.*

Christmas came to Chris:ie  
Whi:e, and cold, and misty;  
But Chris ie's Leart was gay  
And warm, on Christmas Day.

For it was the birth-time,  
Blessedest of earth-time,  
When the world first wist  
The coming of the "Christ,"\*  
Of whom, when he's older,  
Christie will be the "Upholder."

Chris ie's father's fighting,  
The world's wrongs he's righting;  
Christie's proud of Dad,  
S: his heart was glad,  
And with Pat and Mother,  
He wshed the day no other.

Yet may Chris ie's prayer,  
Be that the New Year fair,  
With the sunlight lengthening,  
And his own life strengthening,  
Bring triumph, and increase,  
Of jus:ice pledge of peace,  
Till Chris mas round once more  
Be merry as of yore.

HERBERT WARREN.

\* Pronounce as in "Christmas."

## A SIMPLE ECONOMY

**I**N many ways the war is causing us to return to the customs of our forebears, and it would not be altogether a misfortune if the women of this generation would learn to bake as their grandmothers did before them.

That would enable them to prepare for household use a bread that is at once cheaper and more wholesome than that provided by the baker. In these days flour must be adulterated, and the main thing is to know what adulterants are used. Nobody on the score of unwholesomeness would reject bread, for instance, which is made of flour, ground as coarse as you like, and potatoes. This bread can be very simply baked and prepared. One of the simplest recipes that we have come across is that sent out from the Rural League. Its economy can be set forth in a very few facts. A sack of flour weighing 280lb. will yield about 95 4lb. loaves, or 380lb. of bread. Now if potatoes are used with it, it will give 120 4lb. loaves, or 480lb. of bread. We have had an opportunity of sampling a loaf made in this way, and can speak very highly of it. It was pleasant to look at, creamy white in colour—not as white as the bread made in pre-war days from pure flour, and not by any means so dark as the

war bread of to-day. It had a nice brown crust, and was altogether attractive to the eye. It was equally so to the palate. We tried it in its natural condition and also in the form of toast, with excellent results in both cases. The bread, in fact, is as good as anything that can be purchased in the shops at the present moment, and the cost is much less than that charged by the bakers under the direction of the Food Ministry. The recipe gives a yield of 18lb. of bread at a total cost for material of 2s., which is equivalent to 6d. for a 4lb. loaf. The present 4lb. loaf costs 9d., if delivered at the door 9½d., and is subsidised, or it would cost nearly 1s. The method of preparing the bread is as follows:

Take 2ozs. of yeast, 2lb. of potatoes, 2 quarts of water, and 4lb. of flour. The first thing to do is to boil, peel and well mash the potatoes, and then to make all the above into what is called a "sponge" (in other words, into a thick batter). Thoroughly mix the same by hand. Next, put it in a warm place, such as before a fire or in an unheated oven, covering it with a cloth. Leave it until it rises, and, when it "drops," add 2ozs. of powdered salt, which should be thoroughly dissolved, and a further 5½lb. of flour. Mix

the whole at this stage into a dough. Then let it rise for about three-quarters of an hour in a warm place (at about the same temperature as before), covering the same as previously. Next, cut and weigh it up into the weights desired. Mould these on a board, and let them remain thereon for about half an hour to rise. Then put them into the shapes or tins required, and in about a quarter of an hour the whole can be put into the oven, which should be ready to receive it. The bread takes about thirty to thirty-five minutes to bake in 1 lb. loaves, or about fifty minutes in 2 lb. loaves ; and the oven should be a "quick" one. The yeast can be obtained at an ordinary corn dealer's (cost, 1d. an ounce) and should be of the Hansa brand, though doubtless other yeasts would answer the purpose. The yeast should be first dissolved in a little water out of the above mentioned two quarts, instead of being put wholly straightway into the mixture. It may be added that the recipe is a prize-winning one and was brought to the notice of the League by a working gardener. The working classes could very obviously improve

their diet and spare their pockets by starting the production of bread of this kind. It may be as well, perhaps, to show how the above 480lb. of bread, or 120 4lb. loaves, are arrived at, and how it comes about that by using 2lb. of potatoes to each 9 $\frac{1}{2}$ lb. of flour, over 25 per cent. more bread from a sack of flour is obtainable. A sack of flour as stated, yields some ninety-five 4lb. loaves, or 380lb. of bread. The recipe in question, in which 9 $\frac{1}{2}$ lb. of flour are used with potatoes, yields some 16lb. of bread. The former of these two weights, 9 $\frac{1}{2}$ lb., is contained just over thirty times in the 280lb. sack. As the 9 $\frac{1}{2}$ lb. with its quantum of potatoes yields 16lb. of bread, it follows that thirty times this 16lb. must come to 480lb. of bread ; and if we deduct from this 480lb. the average yield of bread (380lb.) from an existing sack of flour, we get a difference of 100lb. in favour of the recipe. If we divide 4lb. into 100lb., we get 25 ; this being, of course, the number of 4lb. loaves in excess of the ninety-five above referred to as obtainable when flour only is used. This excess is over 25 per cent.

## WINTER RABBIT BREEDING

By C. J. DAVIES.

**T**HOSE people who took up rabbit breeding last spring and are just now experiencing the trials of a severe winter will probably be disagreeably surprised at the difficulties encountered during the colder season of the year. It is questionable whether in ordinary circumstances it pays to attempt to breed between November and March. This year, however, everyone must make an effort ; it is up to us all to produce as many young rabbits as we can and put them on the market at as early a date as possible. The first trouble will most likely be with does which refuse to mate. When the days begin to lengthen and the birds begin to sing—in other words, when the weather commences to be mild and sunny—there will be little difficulty. But if the season is at all like that of the early part of 1917 the ingenuity of the breeder will be taxed to the utmost to secure litters before May ; or if they arrive, to persuade the does to rear them.

To get the does to breed, it is first of all necessary to ensure that the receipts in the way of nourishment more than counter-balance the expenditure in repairing waste and keeping up the body temperature. Animals soon lose condition during a cold snap if their food is inadequate to fulfil their needs. Therefore feed liberally in cold weather, yet not so wastefully as to permit of adult individuals becoming fat and lethargic. Furthermore, keep the animals as warm as possible. The hutches must not be kept closed up so tightly that they become unhealthily stuffy and smelly ; nor is artificial heat desirable. Many rabbitries have been burnt down owing to the use of makeshifts in the way of heating apparatus, such as lamps and oil stoves left burning at night in cold weather ; and in any case the fumes from these contrivances probably do the rabbits more harm than exposure to cold. Warmth must be secured by providing comfortable nest boxes well filled with straw into which the animals can burrow. When thus equipped and well fed, rabbits seem to be able to stand very low temperatures. It has been no uncommon experience both this year and the last for the present writer to find solidly frozen drinking water and frozen sawdust impossible to clean out day after day in the outdoor hutches.

Assuming that the does have mated, it by no means follows at this time of year that litters will result. During November a breeder with eight does satisfactorily mated obtained only one litter ; the writer has had two failures out of three attempts in December ; and every other breeder can furnish similar tales. The does in many cases make nests, so that it is impossible to feel sure that they have missed until the full time is up. Directly a failure of this sort occurs, the best plan is to give the rabbit once daily in its food, for about ten days, as much saccharated carbonate of iron as will lie on a threepenny piece.

When a litter is expected, the doe must be provided with a very roomy and comfortable nest box filled with hay at least a fortnight before the young are due. If the front of the hutch is chiefly wire-netting, shutters or boards should be placed over the wire at night, and over this straw mats or sacks should be hung. It is important to keep the temperature of the hutch well above freezing point, and the water pot will afford a sure indication of whether success has been achieved. If the weather is mild, no further steps need be taken ; but if frost, snow and cold winds prevail at the time and the measures adopted fail to keep the hutch at a reasonable temperature, it may be advisable to use a hot-water bottle at the time the litter is due. If the doe feels comfortable she will clean, suckle and cover up her young, and once she has performed these offices the chances are all in favour of things going well in the future with them. As far as the writer's experience goes, young rabbits take very little harm in severe weather in a well furnished nest box after they are four or five days old and have grown an appreciable covering of fur. Indeed, torrid heat seems to act as a more marked check

to the growth of a nestful of youngsters than the opposite climatic conditions, one of the chief characteristics of winter rabbits which have not been coddled being the very thick coats which they usually carry when they leave the nest.

There ought to be no difficulty in rearing rabbits born in the winter, for the danger of parasitical invaders is practically non-existent ; yet some breeders who have been quite successful in the spring utterly fail at this season of the year, or only succeed in raising pinched and attenuated specimens far below the average weight of the breed.

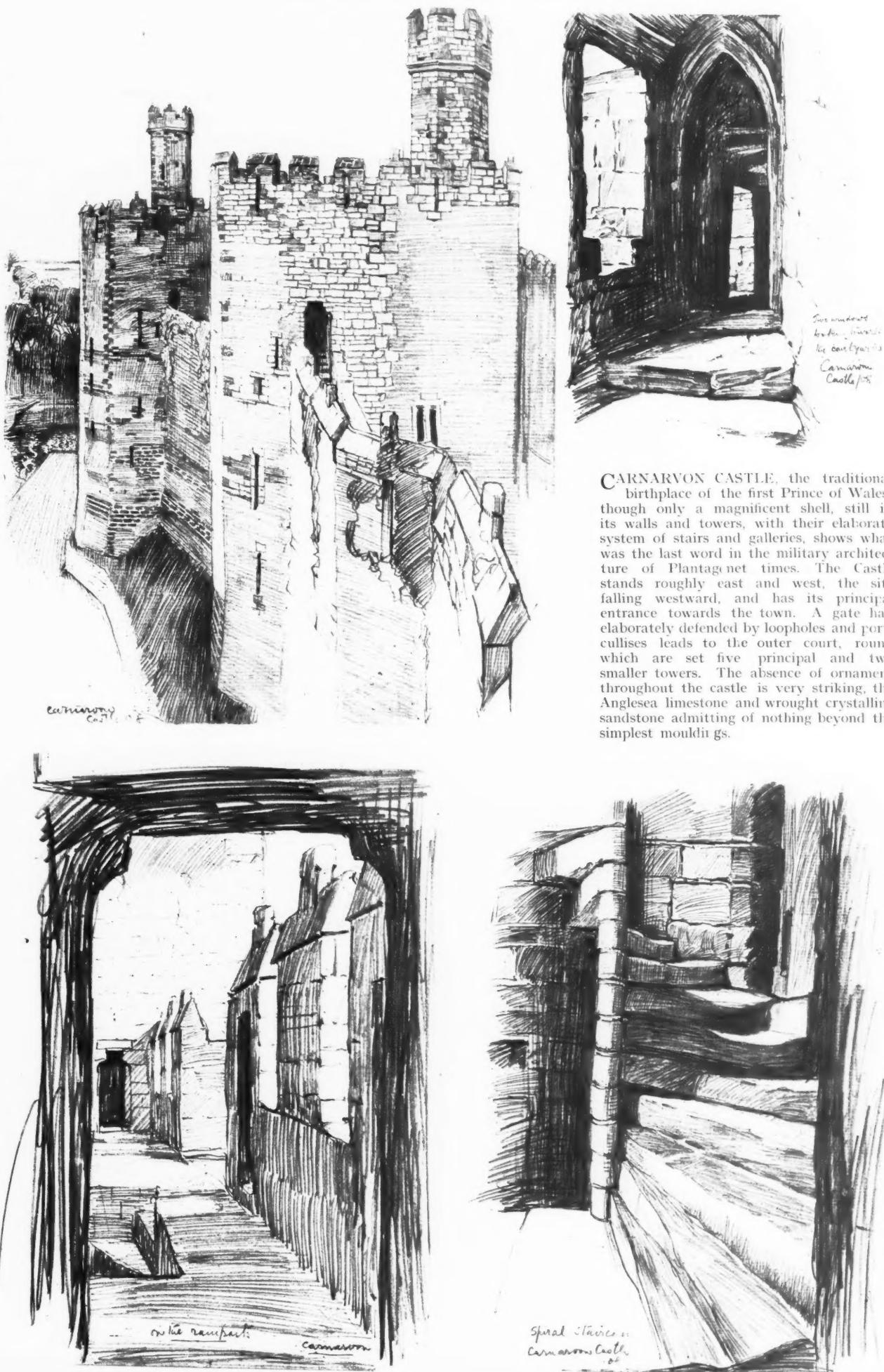
The fault may lie in underfeeding the doe ; but this is not a common cause, because an under-nourished doe will draw on herself and, however much she herself may suffer, will usually be able to supply the requirements of a family of moderate size. When the youngsters become independent of the doe, however, then it is, if the feeding is incorrect, that they succumb to digestive troubles. If the doe is losing flesh and gradually sinking into worse and worse condition as her progeny grow, it may be taken for granted not only that her own dietary is inadequate in some way, but that it will be equally unsuited to the young ones when they begin to eat. The dietary which enables the doe to maintain her condition while rearing her litter is also the one which, in sufficient quantities, will cause the young ones to make the greatest growth of which they are capable.

The ingredients lacking in the dietary at this time of year are flesh-forming or albuminoid substances. It is this ingredient, and this only, which makes the mother's milk, enables her to keep her flesh or "condition," and enables her young to grow, and in proportion that it is lacking, so will the rabbits do badly. In the spring the grass and growing greenstuffs contain a sufficiency of albuminoids to supply the needs of small breeds of rabbits. In the winter we have to rely on comparatively indigestible and innutritious hay to take the place of grass, and on roots to take the place of laxative foods, and the latter are almost totally lacking in albuminoids. Breeders who rely upon these two foods and a few oats can rarely succeed in rearing well developed youngsters, for the simple reason that the rabbits are not being supplied with the ingredients required to enable them to grow. The hay and roots are excellent, indeed, indispensable, as part of the food in winter rabbit breeding, but they must be supplemented with a small amount daily of a concentrated food containing from 15 per cent. to 20 per cent. of albuminoids. Equal parts of bran and maize gluten feed, or bran and ground linseed cake, or some other cattle food, will supply the rabbits with what they require, and breeders who have never hitherto adopted modern scientific methods of feeding will probably be astonished at the satisfactory results obtained by using a well balanced instead of an incorrectly compounded dietary.

There is another thing which is a necessity if the best is to be made out of growing rabbits, and that is water to drink. Thousands of hutch rabbits are reared and exist without it ; but English fancy rabbits are far below most Continental races in size and vitality, and great size and rapid growth cannot be obtained without water to drink. Rabbits usually drink very little ; but in the writer's experience they all drink at least once daily, and, furthermore, when accustomed to it, they soon become actually ill if kept for a time without it. The sight of rabbits drinking when they return from a show where they have been deprived of water for several days ought to convince the most sceptical of the desirability of supplying them with it. It is a mistake to suppose that unlimited greenstuff or roots supply all the liquid required. It is as reasonable to suppose that a man who has consumed a meal in which a quart of liquid figures as one of the ingredients in the food does not require his glass of beer. Most of the digestive troubles of young rabbits are, it is believed, due to want of drinking water.

## LEAVES FROM AN ARTIST'S NOTEBOOK

MISS ELEANOR FORTESCUE BRICKDALE.



CARNARVON CASTLE, the traditional birthplace of the first Prince of Wales, though only a magnificent shell, still in its walls and towers, with their elaborate system of stairs and galleries, shows what was the last word in the military architecture of Plantagenet times. The Castle stands roughly east and west, the site falling westward, and has its principal entrance towards the town. A gate hall elaborately defended by loopholes and portcullises leads to the outer court, round which are set five principal and two smaller towers. The absence of ornament throughout the castle is very striking, the Anglesea limestone and wrought crystalline sandstone admitting of nothing beyond the simplest mouldings.



**S**o far our attention has been mostly directed to the exterior of Chatsworth, to the work of masons and sculptors, of smiths and plumbers, of garden makers and water workers. But, although all such work was done in a large and excellent manner, even greater sumptuousness was lavished upon the interior. The decorative arts had been raised to a very high level in England at the latter end of the seventeenth century, and the fourth Earl of Devonshire took full advantage of this development. It was a matter of deft craftsmanship working on fine material, and much of the latter was obtained. Some of the best was at hand. Derbyshire alabaster, fully appreciated by

the fifteenth century monument sculptors, was freely brought to Chatsworth. The first mention of it in James Wheldon's accounts is in October, 1688, and there are several other entries in the four years' interval before we reach the item "Alabaster for the Altarpeecce and Staircase," which the carvers wrought in the admirable manner revealed by the illustrations. In the same month that this alabaster is paid for Verrio receives the final instalment of the £550 for which he had bargained "for painting ye great chamber, staircase and altarpeecce." He had arrived to supplement the younger and less famous artists Ricard and Laguerre at the end of 1690, and tradition goes that he fell out with Mrs. Haslet,

wife to "John Haslet the Keeper." As housekeeper she received an annual stipend of £3 6s. 8d. and an additional £7 10s. for her board. She provided food for Talman and others on their occasional visits, and received 5s. a week for the board of "Signior Vitti the gilder," who was for some years at Chatsworth at a yearly wage of £30. But not so the other artists. They made "bargains" with the Earl covering all their expenses. How Mrs. Haslet offended the important "historical" painter, who twenty years before had received £2,430 from Charles II for the Windsor ceilings, is unknown, but he paid her off by depicting her on the Great Chamber ceiling as a black clad, haggard and angry Atropos cutting the thread that pretty fair-haired Clotho is spinning. The latter fully appears in the illustration (Fig. 10), but only the scissored hand of Atropos is seen. Less complete than the ceiling were the walls of the Great Chamber when the family came to Chatsworth in August, 1692, and when we find the entry: "Delivered by my hon<sup>ble</sup> Lords order to the woodcarvers upon their new agreement for carving ornaments



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I.—THE CHAPEL ALTARPIECE.

"COUNTRY LIFE."

in Lime tree for the great chamber &c. the summe of one hundred and fifty pounds."

All the State suite has fine woodwork splendidly enriched, but only the Great Chamber, occupying the south-east corner and afterwards known as the State dining-room, is entirely wainscoted from floor to ceiling. By the end of 1692 Henry Lobb and Robert Owen had been paid over £2,000 for wainscotings, made in London and sent down, of which that for the Great Chamber will have been a small,

as seen, for instance, in St. Paul's. There is at Chatsworth a detached specimen of wood carving that is undoubtedly by Gibbons. The chief object therein is a point lace cravat such as he loved to represent. "On the left side is a bird, of which the plumage has a softness and reality which separate it from the very accurate yet a little hard feathering of the Great Chamber dead game. Opposite the bird are flower and leaf of 'airy lightness,' and below there is a portrait medallion. The face is full, and its rather snub nose and



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2.—THE CHAPEL GALLERY.

"COUNTRY LIFE."

though important part. So soon as any was fixed, carvers appeared wherever enrichment was needed. The advent of Thomas Young in 1689 has been noted, and he seems to have been the *doyen* of the carvers, bringing on young men, one of whom has usurped the first place at Chatsworth. It was well to destroy the baseless assertion of Allen Cunningham that "all the wood-carving in England fades away before that of Gibbons at Chatsworth." It is of very high quality indeed, but not quite equal to the master's own best work

heavy lips give it such resemblance to the Kneller and Closterman portraits of Gibbons as to lead to the conclusion that the artist carved his own likeness." Thus I wrote four years ago when I thought it possible that, though Gibbons had nothing to do with the Great Chamber, some other sections of the Chatsworth carvings—the chapel gallery overdoors, for example (Fig. 2)—might have come from his workshops, sent down ready to fix, and paid for direct by Lord Devonshire in London. But I have now gone through



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3.—UPPER LANDING OF TIJOUS STAIRCASE.

"C.L."



4.—STAIRWAY OUT OF THE PAINTED HALL AS RECENTLY ALTERED.

and analysed the whole of James Wheldon's accounts, and gather from them that, for simplicity of book-keeping, it was laid down as a rule that every item of the rebuilding was to be therein entered, whether payment was made in Derbyshire or in London. The list of craftsmen and artists paid by Robert Stafford either direct or through the town agent covers the whole ground, and accounts for all that was done in or out of the house. As Gibbons' name does not occur it is safe to conclude that he was not employed. But it is falling from the frying pan into the fire to displace him and substitute any single man. Yet the latest Chatsworth guide book calls all the carved woodwork "in the style of Grinling Gibbons, but executed by Samuel Watson." Wheldon's accounts show that Watson was a subsidiary personage not to be mentioned by name until after the whole of the south side was completed. He was a Derbyshire man, born at Heanor, a score of miles south of Chatsworth. After he began to work there in 1691 he continued to do so until he died twenty-four years later. His son worked and lived in the neighbourhood, and his grandson collected his papers and drawings, all or part of which are now in the Chatsworth Library. The drawings are often copies of things done by others, such as Laguerre's paintings and Cibber's statues. It does not therefore follow that he executed what he drew of wood carving. The drawing of the State bedroom chimneypiece (Fig. 7) is exact except that there are doves instead of winged boys' heads. Is it, then, the original design for that chimneypiece, the alteration of detail being made in execution? Probably so, but neither Wheldon's accounts nor Watson's notes particularise any work done in any State room except the Great Chamber. Quite £1,000 had been paid to the carvers before that room was begun, and until then payments were entered in the name of Thomas Young "upon his bargains of Carvers work," although sometimes William Davis received the cash. In March, 1691, £55 are "delivered to Mr. Young and — Lobb in part of their bargains of carvers work." The Christian name of this new arrival is still ignored by Wheldon, who only knows Henry Lobb the "London Joyner." But in August he duly appears as Joel Lobb, and next month he and Young receive £200, the largest single payment made to the carvers. In the Watson papers there is a note implying that Young and Watson were undertaking work both at "Burley for my Lord of Exeter," and at Chatsworth "before Mr. Lobb was concerned," and the memorandum between Lord Devonshire and the carvers entered into when he was at Chatsworth the following year states that Young and Lobb were the "masters" of Watson and Davis. It runs as follows:

Sept the 9th 1692

It was then Agreed between the Right Honble the Earl of Devonshire & Joell Lobb & Willm Davis & Samll Watson Carvers that for & in Consideration of



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5.—TIJOU'S STAIRCASE.

"COUNTRY LIFE."

one Hundred & 50 pound in hande paide and two Hundred and fifty pounds more to be devided & paid at 3 Several payments the said Joell Lobb & Willm Davis & Samll Watson shall Carve y<sup>e</sup> ornaments of Lime Wood worke for the greate Chamber According to the designe Aprooved by his Lord<sup>P</sup> and shall finish y<sup>e</sup> same By mid sumer next and shall perforne y<sup>e</sup> Worke in the Best manner: that it shall be as good or better than Any such Like worke is Hetherto don and y<sup>e</sup> worke to be Valued Afterwards, the worke is to be devided into 3 Equall partes: and a third parte of y<sup>e</sup> money to be paid when a third parte of y<sup>e</sup> Worke is finisht and sett up: also it is intended yt all the ornaments of the uper story shall be finisht by midsummer and also the Carveing of y<sup>e</sup> cornish of the Hall as his Lord<sup>P</sup>. hath directed: and all through Willm Davis and Samll Watson are parties to this Agreement yt it is intended to be upon y<sup>e</sup> Account of their Masters Thomas Young and Joell Lobb

Witness thereto  
James Wheldon

Joell Lobb  
Will Davis  
Samll Watson

The memorandum shows that this band of carvers has the whole of the State Room suite in hand, and that

what is still unfinished in drawing, music, bed, and dressing rooms is to be completed, as well as that now to be undertaken in the Great Chamber, by the end of June, 1693. Young remains the senior of the band, but is not proposing to take part in the Great Chamber work. Davis and Watson are under articles to Young and Lobb, to whom all money comes, and who pay them, as employés, some wage or share unspecified. Watson is mentioned last and signs last. He is the junior in position, and there is nothing to show that he is the superior in craftsmanship. But the others disappear and are forgotten. Watson and his descendants remain on the spot and his memory is kept fresh.

It must be noticed that in the memorandum "the Cornish of the Hall" is mentioned. But the painted hall is on the east side of the quadrangle, and we found that Talman did not receive the "first payment beforehand for building up the East side" until July, 1693. It is clear that the east side there referred to is that which replaced Bess of Hardwick's east side, a narrow building (of which the first





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7.—IN THE STATE BEDROOM.

"COUNTRY LIFE."

floor is to be occupied by the new gallery or the library), against the inner side of which—thus reducing the width of the original quadrangle—lies the building containing the painted hall and the main staircase approach to the State suite. The necessity for such an approach must have been evident from the first. To reach the rooms of ceremony up a narrow corkscrew stair was inadmissible, and the building occupying the angle where the new south and the old east side met must have been part of the 1687 plan. Accordingly, in the following year we find the first payment made to Tijou for "his bargains for the ironwork of the stairs." Such payments continue for a year, and then we find him engaged on exterior work. But in October, 1691, he is again at the stairs, and a year later his man receives "6 weeks wages for making y<sup>e</sup>

"Ironwork for the Stairs in the Hall," he himself coming down to Chatsworth about this time, no doubt to see that all is rightly erected and complete. It is quite possible that when Tijou began the job it was intended to start the stair from the ground in the corner building, and that only afterwards the painted hall was decided on with the first flight of the stairs within it. Then the ground floor space under the upper flights was assigned for a vestibule opening out from the pillared way under the south gallery of the quadrangle and richly treated with stone and marble carvings by Ben Jackson as a "Grotto" in 1694. The painted hall and the flight of stairs out of it (Fig. 4) were altogether different in 1692 from what they became under the sixth Duke, who made extensive alterations from 1814 to 1840. He himself tells

[Jan. 12th, 1918.]



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8.—IN THE STATE MUSIC ROOM.

'COUNTRY LIFE.'

us what he found and what he did:

The former steps here were decidedly much handsomer than the present ones. They were a double flight not projecting nearly so far and showing the alabaster doorway in the middle that still remains, tho' concealed, in its old place: but they were exceedingly steep and inconvenient and the gallery round the room (an afterthought) could not have been added to them.

These galleries he erected along both sides of the hall, and they and the new flight of stairs had clumsy balustrading. Under the advice of Mr. Romaine Walker the present Duke has removed one of the galleries and replaced the balustrade with ironwork copied from that by Tijou on the upper flights. These lead up to the second floor, and at each end of the landing (Fig. 3) is a superb alabaster doorway with broken pediment and with beautiful floral wreathing in the frieze. Above we see Verrio's ceiling, and other floral wreathing depends from the cornice rings and enframes niches for statues. One of the doorways opens into the Great Chamber, where Lobb and Davis and Watson wrought beyond the assigned time; for it is March, 1694, before they get paid "for finishing the Lime tree carving of the Upper Story." Their Great Chamber design shows some originality. Grinling Gibbons, apart from the swags and general enframing of mantelpieces, doorways and great portraits, generally limited his carvings to narrow drops between panels, leaving the panels plain. In the Great Chamber (Fig. 6) we find some plain panels, but the more important ones have wreathing depending from consoles that support a projecting bit of entablature. From this chamber we pass to the drawing-room (Fig. 9), with Mortlake tapestries from Raphael cartoons upon its walls. They were set in the right

manner of the age in simple mouldings, in character with the panels and not asserting themselves, as do their present rather heavy and violent frames. It was the sixth Duke who had the "shabby mouldings round the tapestry removed and replaced by good ones." Next comes the music-room (Fig. 8). The doorway on the north side was moved here by the sixth Duke from the dressing-room. In the frieze is the carved trophy containing "Watson's pen," as it has always been proudly called by the descendants and friends of the native wood carver. There was, of course, no doorway here originally, for it was an outside wall. The old hanging gallery only served the floor below, and much as the appearance of the quadrangle has suffered by replacing

it with a three-storeyed building, the convenience of getting to the rooms without passing through others is certainly very great. The space at the south-west corner corresponding to that occupied by the Great Chamber at the other end is divided into the State bed (Fig. 7) and dressing-rooms, showing wood carvings in the same manner. But the corner mantelpiece—after the manner of one at Hampton Court—in the latter room is a recent addition, the drops on each side being original, but moved to this very appropriate spot.

Altogether the suite constitutes the finest and least altered set of rooms in a private house dating from the crowning moment of carved and enriched wainscoting in England, and one is thankful that they were so little tampered with by the sixth Duke. It was touch and go, for he did not approve of "this great unappropriated apartment which consumes in useless display the best habitable part of the house. What bedrooms might have been made here with the South sun and beautiful views. I was much tempted, but finished conservatively by repairing the sinking floors and threatening ceilings; and as a museum of old furniture and a walk in bad weather I am well contented to retain this dismal range of Hampton Court-like chambers."

Below the State bed and dressing



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9.—THE STATE DRAWING-ROOM.

"COUNTRY LIFE."

rooms is the Chapel, where both wood and marble were used as materials for sumptuous decoration. The latter is reserved for the altarpiece (Fig. 1), which rises from floor to ceiling. The marble cartouche and drapery swags lightly break over the black frame of Verrio's picture of the "Incredulity of St. Thomas." Cibber's figures of Faith and Hope stand in front of the pilasters of the upper part. What other artists and craftsmen were concerned here we do not learn from the accounts, which



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10.—THE GREAT CHAMBER.

"COUNTRY LIFE."

seldom name the Chapel. But, besides the local alabaster already referred to, the altar-piece will have required part of the large importation of foreign marble made in 1691, when £552 10s. was paid "in Holland and London" for vases and blocks of marble which were reshipped in London for Hull on their way to Chatsworth. The tall candlesticks on each side of the altar may be the ones for which £60 was paid at the same time as the marble. The ceiling and upper half of the walls are treated as a single area for the architectural and figure compositions of Verrio and his fellow painters, Ricard and Laguerre, who all continue to appear in the accounts for some years. Below the painted area is enriched wainscoting with broad plain panels, and narrow ones with carved swags. The altar is at the west end, while the east end is occupied by the gallery (Fig. 2) for the family, which has two exceptionally fine doorways with cherubs sitting on the pediments. Of such Grinling Gibbons was a past master, and Mr. Rogers, the wood carver who did so much to save the Belton and other carvings and was the chief nineteenth century student of the master, attributed the chapel carvings to him. Careful examination, however, will here again, as in the Great Chamber carvings, support the inference derived from the accounts, that we find therein a full list of the wood carvers employed. The half year beginning Lady Day, 1694, has a new form of heading, for the owner is now "the Right Noble William, Duke of Devonshire," he being one of the Whig leaders on whom William III bestowed the strawberry leaves. He also obtained the Garter, which, with the ducal coronet, now begins to appear in the carvings and other decorations. The summer visits to Derbyshire are regularly paid and spent almost entirely at Chatsworth. In 1697 the family arrive on August 20th and remain till November 1st. The footmen and kitchen boys probably travelled by wagon, but the butler will have ridden, as a horse is hired for him. "Ye black boy Will: Suppers" is among the staff brought down and appears to have come with a deficient wardrobe, for Wheldon has to enter a charge not only for his board wages, but also "11s. for 2 pair of shoes & a pair of Stockings." Wheat is bought at the market to the value of some £6 a week during this period, but other purchases are lumped together as "Ashates."

and only occasionally do we get such an item as: "For Partridges, Pooches & Butter to pot them and Venison £2. 9s. od." Crayfish were plentiful, and it was a compliment to send a present of twenty dozen to my Lord of Exeter at Burghley. Aviaries, which had been so extensive and elaborate as adjuncts to French châteaux as early as the sixteenth century, were also introduced into England, and were still fashionable. Thus an important range of "Bird Houses" is now ready on a space of ground north of the house at Chatsworth, where the present courtyard and the sixth Duke's wing now stand. Inmates for these bird houses are obtained in 1698, when we find the entry:

	£ s. d.
Phesants, a pr of Ducks and 7 Canarybirds..	8 3 6
More to him for Outlandish fowls .. .. ..	2 15 6

As we know from contemporary pictures, parrots were as fashionable as black boys with society ladies, and were soon introduced at Chatsworth, where payments are made for "Hempseed for the Mackeay." The considerable sum of £6 17s. 2d. is disbursed for "Wheat Bread & Milk to feed the fowls y<sup>t</sup> came out of Lincolnshire," these being "19 dozen & 9 Ruffs and Reeves" which arrived in August, 1698, and cost £16 19s. 6d. The feeding and other expenses of hounds appear only to occur during the period of residence, and stable expenses do not seem large considering that the Duke did his share of racing, as we learn from his visits to Newmarket, to which also his groom's expenses are twice paid in 1698. "Clothes for y<sup>e</sup> Jockey boy" is a repeated item. Young colts receive attention, but resort has to be made to neighbouring Haddon Hall for their treatment, and £1 17s. 9½d. is paid to "Ye Earle of Rutlands Farrier for comming severall times to them and for Remedies and drinks for them." Considering the Duke's reputation for keeping "a noble house and equipage," Chatsworth was run on more modest lines than we should have expected. There was a mere skeleton of a permanent staff, to which were added about seven servants from London (for whose travelling charge the carrier gets 28s. apiece), while some fifteen "constant helpers" and a few "extraordinary" ones are collected locally for the three months the family generally spent there. H. AVRAY TIPPING.

## RECLAMATION ON THE CHILTERNS

**O**N the occasion of a visit to Chequers Court about a fortnight ago I was extremely interested in the reclamation work which is being carried out on Sir Arthur Lee's Chiltern Hills farm. His agricultural *alter ego* was so busy at the time instructing one or two fine healthy country girls in the art and science of tractor ploughing that one could not do more than ask him, when he had leisure, to write out a few particulars about it. The result was the most interesting table printed below. It throws a new light on the future of war agriculture on the Chiltern Hills. It is a simple table, and a mere glance will show the noteworthy progress that has

been made. The increase in the wheat, oats and roots area; the production of barley, rye and potatoes where they were not grown before; the increase from 53 acres to 273 acres under arable; and, above all, the change from 222 acres of derelict or loafing land to none, forms a surprising and brilliant achievement. The efficiency of the agricultural operations is borne out by the striking increase in the value of what has been produced. It effects both crop and stock. The former showed an increase in 1914, and since then has been quintupled. We are not given the total value of stock and crop before Sir Arthur Lee's advent, but it increased from £1,153 odd in 1914 to £7,254 odd in 1917.

RETURNS OF LAND AND CROPPING ON CHEQUERS FARM, 1913-1917.

	Wheat. Acres.	Barley. Acres.	Oats. Acres.	Rye. Acres.	Potatoes. Acres.	Roots. Acres.	Rotation		Total Arable	Permanent	Derelict or	Rough Down-	Total						
							Grasses. Acres.	Bearing Crop. Acres.	Pasture. Acres.	Loafing. land	Grazing. Acres.	Acres.							
1913 (farms taken over September, 1913)	15	..	..	13	..	..	10	..	15	..	53	..	192	..	222	..	109	..	636
1914 .. .. ..	30	..	6	..	36	..	15	..	15	..	103	..	197	..	167	..	169	..	636
1915 .. .. ..	30	..	16	..	40	..	18	..	15	..	131	..	213	..	123	..	169	..	636
1916 .. .. ..	62	..	18	..	47	..	18	..	16	..	166	..	221	..	80	..	169	..	636
1917 .. .. ..	50	..	30	..	108	..	20	..	18	..	242	..	214	..	11	..	169	..	636
" (taken over July 1917) .. .. ..	..	..	..	..	..	..	..	..	..	..	42	..	40	..	—	..	—	..	—
1918 (proposed) .. .. ..	50	..	40	..	60	..	18	..	57	..	30	..	12	..	273	..	274	..	—
																			716

### PARK LAND BROKEN UP.

1916. The Dene and Cradle piece .. .. .. .. .. 47½ acres.

1917. Broad field .. .. .. .. .. 25½ acres.

Horses.	Inventory of Farm Live Stock.			Sheep.	Value of Crop.	Total Value of Stock and Crop.
	Cattle.	Swine			£ s. d.	
1914 .. 5	.. 39	.. 22	..	144*	.. 646 9 0	.. 1,153 9 0
1915 .. 4	.. 80	.. 45	..	305*	.. 2,231 0 0	.. 4,481 17 0
1916 .. 4	.. 102	.. 100	..	372*	.. 2,921 2 2	.. 5,447 14 2
1917 .. 5	.. 104	.. 85	..	170†	.. 3,292 5 0	.. 7,254 5 0

\* Scotch "Black Face" lambs.

† "Grey Faces."

## BUZZARD V. PHOTOGRAPHER.—II

BY ARTHUR BROOK.

**T**HE moment for which I had waited so long was preceded by an almost dramatic incident when at 10.30 a.m. the cock made an attack upon my hiding-place. Almost simultaneously the hen swooped down to the nest with another rat, which she deposited on the nest, departing immediately. A few minutes later, looking through a peep-hole that commanded a view of the opposite side of the ravine, I caught sight of the female perched on a prominent rock above the skyline.

During all its visits the buzzard offered no food to the young ones, merely placing the carcasses on the nest and departing. The young birds were now wide awake, and the stronger made another vicious attack upon the weaker. Round the nest it drove the poor little mite, pecking it fiercely whenever opportunity presented itself. I could see that the inevitable was bound to happen and that it was to be a case of the survival of the fittest. It seems almost incredible that so young a bird (about eight days old) could be capable of doing such a thing as I then witnessed. Seizing the other young bird by the back of the head it shook it after the manner of a dog shaking a rat.

At 3.15 p.m. the female, carrying a thrush in her beak, returned again to the nest. The cock tried his utmost to entice her away, but she would not go, and tried her best to call him down to the nest. For a moment I thought this would happen, and prepared to take a photograph of the pair at the nest together, but in this I was disappointed. This time the hen evidently meant business. Seizing the prey in her claws she tore it in pieces, swallowing the entrails and bones herself. The stronger young one, with savage pecks, kept the weaker from receiving any of the tit-bits. The buzzard did not appear to notice this selfish behaviour on the part of her offspring. It was a case of first come first served. Watching my opportunity I took a photograph of the bird actually feeding her young, which was most gratifying after striving so long for such a picture.

Waiting until the bird had finished feeding, my stock of plates being now exhausted, I crept out of the hiding-place

well pleased with my day's work. The male bird again attacked me, following me in the same manner as on the previous day. I mentioned to the shepherds that on my next visit, a week hence, I should not be surprised to find only one young bird in the nest. June 9th was the date of my next visit, and I started at the same time as on the two previous days—4 a.m. The shepherds again accompanied me, and the nest was reached at 7.45 a.m. The expected had happened, for only one young bird was in the nest. Although we made a thorough search we failed to find any trace of the other young one. I have no doubt whatever that it was eaten by the one remaining. The shepherds took their departure at 8.5 a.m. At 8.50 the hen came to the nest, but was very much on the alert. She had brought a mouse, which she left on the nest. The young bird was sheltering beneath the rock from the sun, which was shining brightly. Upon leaving the nest the buzzard flew up to her usual perch on the skyline. Nothing further occurred until 2.30 p.m. and then the hen flew past the hiding-place several times. A few minutes later she settled on the nest, but was most suspicious, and called to the cock bird, which quickly put in an appearance. The hen had brought a lapwing in her claws, and the young bird rushed eagerly from beneath the rock where it had been sleeping. The male buzzard now took a great dislike to the lens and struck the tent a violent blow just above it. Had he been 2ins. lower the camera would have been smashed, so violent was the blow. This manœuvre was repeated six times, and I feared he would actually strike the lens. Why he should take such a sudden dislike to the lens I cannot say, unless it was the German name on it. At 3.55 p.m. the hen came to the nest again, glared at my hiding-place, then flew away with an angry cry.

For five minutes all was silent, save for the murmur of a stream beneath me, and then things began to happen. The cock bird hit the tent another violent blow, sending some of the stones propped against it crashing into the stream below. At the same instant the female settled on the nest, grasped the young buzzard in her powerful claws by the back



SHE STOOD THERE, A MAGNIFICENT SPECIMEN OF A BIRD, AS THOUGH GUARDING HER YOUNG AGAINST SOME IMAGINARY FOE.



I TOOK A PHOTOGRAPH OF THE BUZZARD ACTUALLY FEEDING ITS YOUNG.

of the neck, and carried it from the nest. Fearing for the young bird's safety, I scrambled out to see what had become of it. The old bird had carried her offspring to the other side of the ravine, a distance of fully 20yds., and placed it on the ground. Both birds were flying down as though trying to pick it up again. I was relieved to find it quite unhurt and none the worse for its strange experience.

After this interesting little incident my admiration for the buzzard deepened considerably. Although instinct warned the bird of the presence of its greatest enemy—man—she did not hesitate to carry her young away to a place of safety. Picking up the young bird I carried it back to the

nest, the cock following me in a great rage. Once I had to duck my head to prevent him from striking me.

On June 16th I had greater difficulty than ever in fixing the camera, and the tent showed signs of collapsing. The shepherd had been gone exactly eight minutes when the hen brought a field vole. The young bird rushed to meet her and seized the prey held in her foot directly she landed on the ledge. Taking it to the shelter of the rock the young bird quickly gulped it down. After disposing of this small item the young bird walked clumsily to the edge of the nest, looking out for more. The buzzards appeared less suspicious than on my last visit. At 10.30 a.m. the



THE HEN APPEARED WITH A BLACKBIRD WHICH THE YOUNG BIRD SEIZED AS SHE WAS ALIGHTING.

hen dropped in to see how the young one was faring. Ten minutes later she came again, but brought no food with her. An hour later she came with a meadow pipit held in her foot. The hen appeared again at 12.45 p.m. with a blackbird, which the young bird seized as she was alighting, and spread its wings over the prey as though to keep it from other young ones.

A red dawn, indicating rain, greeted me on June 23rd at 4 a.m. as I started by motor cycle for the buzzards' haunt.

"coming to its colour," as the shepherd expressed it. The cock brought a mole at ten minutes past ten, and the young bird rushed eagerly forward, but made no attempt to eat it. Unless very hungry the youngster would not touch a mole; it preferred a frog or a bird, especially the latter.

A feather stirred by the breeze attracted the young bird's attention, and it was most diverting to watch the youngster's antics with it. The least movement of the



THE HEN BROUGHT TWO MOLES, ONE IN EACH FOOT, TO THE NEST.



A TUG OF WAR ENSUED FOR POSSESSION OF THE DAINTY.

The shepherds left me at 8 a.m., and at 8.45 a.m. the female brings a mole, departing immediately. Five minutes later the cock strikes the tent a violent blow above the lens, and the same instant his mate alights on the nest with a field vole. A few minutes later the cock, for the first time during my sojourn at the nest, brought a mole to the nest, but too near for a satisfactory picture. The young bird made short work of the vole, but left the mole untouched. It had grown considerably since my last visit—on the 16th—and was

feather would cause the young buzzard to pounce upon it and strike viciously with its claws as though to kill the thing. At midday the male brought a frog, which the young bird devoured with evident relish. Thirty minutes later the cock attacked my tent, striking it three violent blows with his claws, which caused the focussing screen to rattle against the dark slide. During this manoeuvre, which was evidently meant to cover his mate's visit, the hen brought two moles, one in each foot, to the nest.

Upon leaving the nest she took one of the moles away with her and, flying up to her usual perch on the skyline, devoured it there. The cock bird did most of the hunting for prey, and the female spent the greater part of her time perched on some coign of vantage watching the nest. At 12.45 p.m. the hen brought a blackbird, which was seized by the young bird directly she landed on the ledge. Upon this occasion the shutter made a slight noise, causing the bird to fly away. She took the prey with her, but left a few feathers in her offspring's beak. I kept perfectly quiet, hoping the bird would soon be back again. Twenty-five minutes elapsed,

however, before she came again, bringing the blackbird with her. The hungry youngster seized the prey as she was alighting, and a tug-of-war ensued for the possession of the dainty, which was quickly swallowed by the young bird, bones and feathers included.

Heavy rain now began to fall, and the tent was soon dripping in a dozen places. A rivulet ran down the mackintosh upon which I was sitting and formed a pool. I stuck it for an hour and a half, but seeing no signs of improvement I took my departure, drenched to the skin.

(To be continued.)

## LITERATURE

### A BOOK OF THE WEEK

**Britain's Heritage of Science**, by Arthur Schuster, F.R.S., and Arthur E. Shipley, F.R.S. (Constable.)

**T**HIS book should be introduced into schools and distributed as much as possible among young people of either sex. It is a well considered and well written résumé of the history of English science, a matter on which the average citizen is profoundly ignorant. One hears constant references, even in quarters where the facts should be known, to the great superiority of Germany as a scientific nation, as though our enemies had been pioneers in this department of progress. The authors of this book scarcely make an incidental reference to Germany, and German names are few and far between in the index. Yet the reader, as he studies the unfolding of scientific thought in Great Britain and has brought before him with vivid clearness pen-pictures of the actual men with whose names only he has hitherto been familiar, cannot but feel proud to know that his country comes behind no other in its cultivation of science. The tale has its beginning with the fine and solitary figure of Roger Bacon, the Franciscan friar who burst the bonds of that scholasticism which fettered intelligence in the thirteenth century, and it ends with the great names of our own day. Roger Bacon is an example of the *nominis omnia* to which so many heroes of the past have been reduced. Yet it was he who laid the foundation of exact thought in this country. Although largely forgotten, his biography is interesting even now. He came of wealthy Dorset parents, studied at Oxford and Paris, and after entering the Franciscan Order, tells us that during twenty years he spent more than £2,000 on secret books and various experiments, languages, instruments and mathematical tables. Intellectually, say our authors, he stood high above the level of his contemporaries, and by his writings set the true standard of scientific enquiry. Even to-day we can recognise in the homely illustration used the simple directness of the Franciscan monk's mind, as, for instance, in the illustration he uses to show that proof must come from experience and not from argument:

If any man who had never seen fire were to prove by satisfactory argument that fire burns and destroys things, the hearer's mind would not rest satisfied, nor would he avoid fire; until by putting his hand or some combustible thing into it, he proved by actual experiment what the argument laid down: but after the experiment had been made, his mind receives certainty and rests in the possession of truth, which could not be given by argument but only by experience.

He is one of the ten landmarks of physical science which are dealt with in the introductory first chapter, the others being Gilbert, Napier, Newton, Dalton, Young, Faraday, Joule, William Thomson and Clerk Maxwell. This constitutes a very small part of the record of physical science in Great Britain. Indeed, it flowered most splendidly in the nineteenth century, which brought into existence men so great and diverse as Charles Darwin, Lord Lister and Lord Kelvin, to mention only three names out of a host. It would be impossible to deal with these studies individually, and the best we can do is to commend them most warmly to the reader's attention. But one or two interesting or amusing points are discussed. One arises out of the plan of the book, which is to separate the heritage of the universities during a period from the non-academic heritage. Most of us have a kind of feeling that the highest mental achievements of any kind are very seldom produced under tutelage. People talk glibly enough about the endowment of research, but that sort of thing is just as likely to lead to the endowment of impecunious students as of research itself, and, at any rate, the struggles of those who have enjoyed neither the training of the university nor the patronage of the State will always be fascinating to the robust and independent Anglo-Saxon

mind, which hates fetters of any kind. Mr. Schuster and Mr. Shipley lay down the principles on which it is possible to appraise the respective efforts, premising that the endowments needed for a scientific investigator are "knowledge, critical judgment and inventive power." The two former—knowledge and critical judgment—come from academic training, but those who know and who possess nicety of judgment have a handicap of their own. They come under a thrall compounded of tradition and authority, so that they are usually to seek when the time comes for a revolution of fundamental ideas. If the academic tradition is strong enough to prevail with them, "the advantage then lies with those who are not burdened by the weight." This leads to an ingenious digression on the theme, What constitutes an amateur? The word literally signifies "one who is fond of," but, as they very wisely observe, it has got into its significance a touch of weakness. "Feeble amateurs" is a classic expression. Yet the amateur occasionally will break the bonds that have proved too strong for the ripe scholar. Robert Boyle appears to have got the best of his education while making the Grand Tour with a French tutor. William Herschel affords a still more striking example. He was in early days a poor Hungarian who earned his living by playing the oboe. Thence to the position of unrivalled pre-eminence as an astronomer was a march indeed. Humphry Davy began, like the poet Keats, by being apprenticed to an apothecary, while at the same time his widowed mother kept a milliner's shop. Our authors do not destroy the tradition of James Watt and the tea-kettle, but they correct a misapprehension on the part of the old lady cousin of Watt who, fifty years after its occurrence, dictated a memorandum on the subject: "It was not the power of steam that Watt was watching, but the condensation into water when the steam came into contact with a silver spoon." George Stephenson, who did more than anybody else towards the practical application of steam to locomotion, spent his early days on a farm scaring birds at sixpence a week, and gained what rudiments of education he possessed later, when as a young miner he took to attending a night school. Science, like art, is full of romances in real life similar to these, and no doubt our authors are right when they say that the outside amateur has this advantage over the academic student, that his mind is not fettered by tradition.

A general impression formed in one's mind is that the scientific student, whether he was in or out of college, has in a vast majority of cases concentrated his whole effort in one direction. The instances of versatility are few and far between. Perhaps the best known example is to be found in Erasmus Darwin, the author of the "Loves of the Plants." Mr. Shipley, unless we are mistaken in tracing his Roman hand, wrote the following paragraph himself:

In many respects Erasmus Darwin was in advance of his times. He was, for instance, a great advocate of temperance, and Mr. Lucas has lately reminded us of his inhuman advice: "If you must drink wine, let it be home-made," surely the shortest cut to total abstinence yet devised by the wit of man.

Probably he also is responsible for quoting from Cowper and Halley's poem on Erasmus Darwin:

No envy mingleth with our praise,  
Tho' could our hearts repine  
At any poet's happier lays,  
They would, they must, be thine.

Although the volume is not devoid of amusing passages, we do not recommend it on that account, but because it is a serious and masterly attempt to set before the English-speaking public the true facts about this nation's heritage in men of science and their works, those works which permeate the intellectual world and become kneaded into the national life, so much so that identity and individuality become lost to every eye except that which is trained to see.